

REMARKS

Claims 1-5 are all the claims pending in the application.

Prior art considered:

U.S. Patent No. 4,334,098 Mookherjee et al. (Mookherjee).

The Rejection:

Claims 1-5, all active claims, are rejected under 35 U.S.C. § 102(b) over Mookherjee.

The Examiner's position is set forth in the action and will not be repeated here except to assist in an understanding of Applicants traversal which is now presented.

In response to the first Office Action, Applicant's argued that the present invention differed from Mookherjee because the intended product was different. In addition, the δ -trans isomer (1a') was deleted from the claims to clarify the differences from the product desired in accordance with the present invention as compared to the product desired in Mookherjee.

The Examiner, however, maintains the rejection over Mookherjee because the present claims in Mookherjee both relate to processes and the same starting materials are used under, the Examiner's view, the same conditions.

C The process of the present invention and the process of Mookherjee are the same in the ^{trans} ~~δ -cis~~ isomer (1a') is obtained from δ -cis isomer (1a). However, Applicants advise in Mookherjee, the yield is 75% in Example II and 78% in Example X (1085 g to 847 g). Mookherjee does not describe the α -isomer (1b) and β -isomer (1c) where the position of the double bond has been changed.

Mookherjee obtained trans isomer (1a') in Fractions 2-7 (b.p. 85 to 90°C, 9-11 mm pressure) in Example X. In addition, Fraction 1 (b.p. 38-81°C, 9 mm) pressure and Fraction 8

(b.p. 97°C, 11 mm pressure) were obtained. If the α -isomer (1b) and β -isomer (1c) where the position of the double bond has been changed might be formed in the process of Mookherjee, the α -isomer (1b) and β -isomer (1c) should exist in Fraction 1 or Fraction 8.

One of the present inventors measured the relative volatilities of the δ -cis isomer (1a), the δ -trans isomer (1a'), the α -isomer (1b) and the β -isomer (1c) with the following results:

Average relative volatilities (according to Fenske's equation)

δ -trans isomer (1a')	α -isomer (1b)	δ -cis isomer (1a)	β -isomer (1c)
1.1650	1.0000		
1.1765	1.0099	1.0000	
1.2956	1.1013	1.0905	1.0000

From the above table, it is clear that δ -trans isomer (1a') has the highest volatility (i.e., the lowest boiling point). Thus, the present inventors assumed there might be a possibility that α -isomer (1b) and β -isomer (1c) exist in Fraction 8 of Mookherjee.

One of the present inventors then carried out experimentation following the essential conditions of Mookherjee. The results are shown below.

Catalyst	Temp./ Time	Solvent	1a	1a'	1b	1c
KOH (10 wt%)	135°C/4hr	Polyethylene glycol dimethylether	6.7	93.3	0.0	0.0
28% NaOMe Methanol solution (10 wt%)	85°C/4 hr	Methanol	10.1	89.9	0.0	0.0

As is clear from the above table, it is not possible to obtain α -isomer (1b) and β -isomer (1c) following the process of Mookherjee. Accordingly, Fraction 8 in Example X of Mookherjee contains the starting material, δ -cis isomer (1a), not α -isomer (1b) and β -isomer (1c).

The distinction, the object of the present invention is to provide the α -isomer (1b) and β -isomer (1c) which cannot be obtained by the process of Moorherjee. Because the compounds obtained are different between the present invention and Mookherjee, the only logical conclusion is that the processes are different.

The reaction in Example II of Mookherjee is in ethanol (b.p. 78°C) for 25 hours, and the reaction in Example X of Mookherjee is in methanol (b.p. 64°C) for 24 hours. Because these reactions were carried out under reflux, the boiling point of the solvent is almost the same as the reaction temperature.

In the present invention, the reaction of Example 1 is at 90°C for 24 hours, the reaction of Example 2 is at 175 °C for 4 hours, the reaction of Example 3 is at 100°C for 4 hours, the reaction of Example 4 is at 175°C for 6 hours, the reaction of Example 5 is at 120°C for 2.5 hours, the reaction of Example 6 is at 140 to 145°C for 5 hours, the reaction of Example 7 is at 120°C for 4 hours, the reaction of Example 8 is at 130 to 140°C for 6 hours, the reaction of Example 9 is at 140 to 145°C for 6 hours, the reaction of Example 10 is at 170 to 190°C for 6 hours, and the reaction of Example 11 is at 135°C for 3 hours.

In Moorherjee, the reaction is carried out under conventional basic conditions in an alcoholic solvent, i.e., Example II uses potassium hydroxide as a base in methanol and Example X uses sodium methoxide as a base in methanol.

In distinction, when a base is used in the present invention, use of a solvent having a high boiling point and high polarity such as tetraethyleneglycol monomethyl ether (Example 2), dimethyl sulfoxide (Examples 3, 5, 6, 7, 8, 10), dimethylacetamide (Example 9), or cyclohexylamine (Example 11) enhances the intensity of the function of the base used in the reaction system so that the reaction can proceed under strong basic conditions. Accordingly, the reaction of the present invention proceeds under much stronger basic conditions than Mookherjee.

Further, according to the present invention, an acid may be used in the reaction (Examples 1 and 4). Mookherjee does not teach or suggest reaction under acidic conditions.

As a result, the process of the present invention can provide 32.5% or more of double-bond isomers (α -isomer (1b) and β -isomer (1c)) (cf. Example 10).

In particular, the present invention permits obtaining 47.7% or more of double-bond isomers (α -isomer (1b) and β -isomer (1c)) (cf. Example 7) by using potassium t-butoxide (Examples 2, 3, 6, 7, 9) having higher basicity than potassium hydroxide and sodium methoxide, as used in Mookherjee.

As it is clear from the above explanation, the conditions for the process of the present invention are quite different from those of Mookherjee. The process of the present invention enables one to obtain α -isomer (1b) and β -isomer (1c) which cannot be obtained by the process of Mookherjee.

In light of the above, it is quite clear that the process of the present invention obtaining the products of the present invention as claimed is both novel and unobvious over Mookherjee.

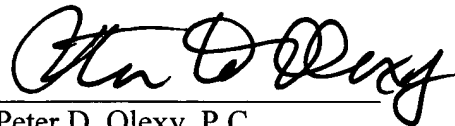
Withdrawal of the rejection over Mookherjee is requested.

RESPONSE UNDER 37 C.F.R. § 1.116
Application No. 09/875,158

The above data will shortly be submitted in the form of a DECLARATION UNDER 37
C.F.R. § 1.132.

The USPTO is directed and authorized to charge all required fees, except for the Issue
Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any
overpayments to said Deposit Account.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Peter D. Olexy", written over a horizontal line.

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Date: June 7, 2002